

What is claimed is:

1. A shutter-shield system, for reducing potential human risk of cumulative effects from extraneous x-radiation, applied to a collimator including a collimator housing configured with a fixed working aperture and deployed in conjunction with an x-ray tube for a designated inspection purpose conducted totally within an overall shield housing, comprising;

a shutter-shield plate configured with a shutter aperture made generally similar to the fixed working aperture in size and shape;

a shutter support structure made and arranged to retain said shield shutter plate constrained with ability to shift within a predetermined travel range between (1) an open-shutter condition wherein the shutter aperture is aligned with the fixed working aperture so as to allow x-radiation through a thus combined aperture for the designated inspection purpose and (2) a closed-shutter condition for standby purposes wherein offset displacement of the shutter-shield plate causes the shutter aperture to be similarly displaced offset from the fixed working aperture so as to in effect close the combined aperture and thus substantially contain x-ray radiation within a region of the collimator housing bounded by the shutter-shield plate; and

a drive mechanism attached to collimator and operationally connected to said shutter-shield plate, made and arranged to actuate transition between the two shutter conditions in response to a control signal.

2. The shutter-shield system as defined in claim 1 wherein said drive mechanism and the shutter-shield plate are configured and arranged to deploy one of the two shutter conditions whenever said drive mechanism is powered and to deploy the other of the two shutter conditions whenever the said mechanism is not powered.

3. The shutter-shield system as defined in claim 2 wherein said drive mechanism comprises:

spring biasing means, operationally connected to said shutter-shield plate, made and arranged to urge the shutter-shield plate to move to a first end of the travel range whenever the electrical solenoid is not powered; and

an electrical solenoid, having a plunger operationally connected to said shutter-shield plate, made and arranged to urge the shutter-shield plate to move to a second end of the travel range, opposite the first end, whenever the electrical solenoid is powered.

4. The shutter-shield system as defined in claim 3 wherein said shutter-shield plate is configured with the shutter aperture located in a manner to deploy the open-shutter condition at the first end of the travel range, i.e. whenever the solenoid is not powered, and to deploy the closed-shutter condition at the second end of the travel range, i.e. whenever the solenoid is powered.

5. The shutter-shield system as defined in claim 3 wherein said spring biasing means comprises at least one coil spring having a first end attached to said shutter-shield plate and having a second end, opposite the first end, attached to the collimator housing.

6. The shutter-shield system as defined in claim 1 further comprising:

a pair of ball-bearing slide assemblies, each having a first member attached to said shutter-shield plate and a second member attached to the collimator housing, made and arranged to provide said shutter-shield plate with freedom of movement, but only in a predetermined linear direction and within the predetermined travel range.